

# the RARS ~~Exciter~~

Raleigh Amateur Radio Society



Worldwide Friendship

May 2000

Number 355



## Great Hammin' at the RARSfest

**A good time was had by all at this years hamfest!** Although it was one of the coldest 'fests on record, it didn't keep the crowds away. There were 2,662 attendees. This was only down by 64 from last year. That is actually good news considering that the previous three years 'fests were down by over 250 each year. Maybe the new licensing restructuring will pour more hams into the HF arena and attendance and sales at hamfests will pick up. We've got our fingers crossed!

Speaking of licensing restructuring, there were about 113 people at the VE session this year. More than double the usual numbers. Other highlights from the 'fest were a presentation by Riley Hollingsworth K4ZDH. Close to 240 attended his talk. For those that missed it we do have it on video tape. There was also the QLF and QBH contests which always prove entertaining.

Many thanks go to Hamfest Chairmen who worked hard long

before the doors opened on April 9th. Although we were very thin on volunteers there were a handful of folks that worked many shifts to fill in. Our sincerest gratitude to all those that helped make this hamfest a success!!!

**Cyndi KD4ACW & Tim KF4RTX**

**Next RARS Meeting: Tuesday, May 2nd  
UPSTAIRS on the 3rd Floor!**

Don't forget that the May RARS meeting will be held on the third floor, because the dining room will be used as a polling place for the Primary election.

There will be a special "paperwork" VE session for those hams who upgraded and need to have their applications processed.

Program: **The Telegraph**

## The Exciter

The **Exciter** is the monthly newsletter of the Raleigh Amateur Radio Society. It is available in both printed and electronic form. The printed version is mailed to members just before each club meeting. The electronic form, in Adobe Acrobat PDF format, is e-mailed about a week earlier.

We solicit both articles and advertising. The deadline for submissions is the 15th of the prior month. Contact the Editor.

The views contained in the Exciter are those of the individual authors, and are not necessarily the views of the Editor, or the Raleigh Amateur Radio Society.

## The Raleigh Amateur Radio Society

The Raleigh Amateur Radio Society, Inc. (RARS) was founded in 1969 and continues to serve and support the Amateur Radio community in the greater Triangle area. In 1999, we incorporated a new RARS, and obtained 501(c)(3) Non-Profit tax status.

The objectives of the club are to promote worldwide friendship through Amateur Radio; to be of public service by providing radio communications in times of disaster, emergency, or civic need; to educate members in radio technique; and to provide training classes to assist in obtaining Amateur Radio licenses.

Anyone interested in Amateur Radio is eligible to apply for membership. Dues for regular licensed amateurs are \$18.00 per year (from July 1 through June 30). Additional immediate family members pay \$5.00 each per year. Dues for licensed amateurs older than 59 or younger than 16 are \$12.00 per year. Dues for non-licensed Associate members are \$9.00 per year.

Applications for membership may be obtained from the treasurer, or the RARS web site ([www.rars.org](http://www.rars.org)).

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## Info

### Repeaters:

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444.525 (88.5 PL)  
444.95 (88.5 PL)

### Web Site:

<http://www.rars.org>

## President's Corner

Jack Ritter WØUCE

### Technology and Tradition

Technology is rapidly changing the world. However, many traditions prevail, especially in Asia. This is very apparent as the end of my current business trip draws near. Tomorrow I will board a British Airlines 777 for a direct flight from Beijing to London. I then spend the night at a Gatwick Airport Hotel and on Monday, an American Airlines 767 will bring me to Raleigh in just nine hours.

Looking out my hotel room window in Beijing I see street vendors with clay charcoal pots on the back of bicycles. They are grilling sweet potatoes while others hawk "goodness knows what might be in those noodle soup dishes." Nearby another street vendor is squatting by a cardboard box that has long seen better days; inside this makeshift shop are several puppies. Next to him is an elderly lady with a cage containing ducks and next to her, yet another vendor offering vegetables neatly laid out on a bamboo mat. This is tradition in China; however, the puppy vendor is talking on a cell phone.

Further down the street a crew of China TELECOM workers are installing fiber optic cable. Behind them is the Philippine Embassy with a folded dipole HF antenna, one end attached to a tower supporting an HF Log Periodic, the other end is tied to a piece of bamboo lashed to a chimney. I suspect the HF radio system has been retired in favor of new technology as several satellite antennas also populate the rooftop. I would love to take a picture of this antenna farm but one thing you don't do in Beijing is wander around taking pictures of foreign embassies.

Ah, how technology makes life so enjoyable. I intended to include some pictures of Beijing taken with my new digital camera but the maximum Internet connectivity rate I can get is 9600 on a dial-up connection so the pictures will have to wait for another time. Maybe when I return the new fiber will be operational. Internet and e-mail are wonderful until you lose them. I have not had e-mail for several days now and the feeling of being marooned is starting to set in.

My laptop crashed the day I arrived but one phone call and IBM Beijing promptly sent a service technician to my hotel to fix the problem; she arrived on a bicycle. Thanks to the Akihabra visit, while I was in Tokyo, my little black bag containing different size and shape adapters, alligator clips and other goodies come in handy. I often must jury-rig power adaptors or phone jack plugs, sometimes adaptors are plugged into adaptors and yet another and it all looks like a work of art by a Master Plumber.

The street vendors don't have such problems except the puppy salesman must remember to charge his cell phone battery. Two more vendors just arrived, both carry backpacks, you guessed it, they are offering pirate music and software CD's. Bet if I stroll over and ask, they will offer Windows 2000 at a fraction of the price we pay at home. In Beijing, technology and tradition exist in perfect harmony. I can't wait for June as Field Day is not far off. Twenty-four hours of fun, friendship, cookouts and contesting, isn't it great? Our hobby also offers technology and tradition. 73, Jack

## Public Service Calendar

**April 29:** March of Dimes, RTP

**May 27:** Run for Research - RTP (Glaxo)

**June 2-4:** NC Special Olympics Summer Games



# The American Radio Relay Musical Chairs League

Jeff Wittich AC4ZO



Here it is May already. The new Section Manager is now firmly entrenched in position, and it's business as usual once again. At the recent Rarsfest, I spent some time sitting in some of the forums, something I've never done much of before. I was surprised to see how different they were from what I expected, but I was also surprised to learn how much jostling around of personnel has gone on in the last few months. Here's a brief description of what's happened, from the bottom up.

I'll begin by telling you what has not changed. We are still without a **Wake County Emergency Coordinator**, and the **Section Emergency Coordinator (SEC)** has not changed. That position is filled by David Fleming, KE4JHJ, of Winston Salem. The SEC is the assistant to the Section Manager for the area of emergency preparedness. It's a terribly demanding job when disaster strikes our state. David replaced Charles Hayworth, K4MPJ, about a year ago. Charles also lives in Winston Salem.

The **Section Manager** is the highest ranking official at the Section level. Our *Section* is comprised by the State of North Carolina. Some more populated states have 2 or 3 Sections, and there's about 70 Sections total in the US. The new Section Manager is John Covington, W4CC, of the Charlotte area. John succeeds Reed Whitten, AB4W, who served as Section Manager for 12 years. If you don't like the way the ARRL does things, the Section Manager is a good one to complain to. Reed is now our State Government Liaison, replacing Pete Chenery, KI4AN, of Durham.



*New SM John Covington W4CC*

Going up the line, the Section Manager reports to the Division Director. A division is a group of States. We are in the Roanoke Division, made up of NC, SC, VA, and WVA. The



new Division Director is Dennis Bodson, W4PWF, of Arlington VA. There is also a Division Vice Director who is Les Shattuck, K4NK, of Greenville, SC. Les was the former SC Section Manager. Bodson replaces John Kanode, N4MM, of Boyce VA who vacated the office to become the Third Vice President of the ARRL.

*New ARRL VP*

*John Kannode N4MM*

There are a few Assistant Directors for the Division too, and you may know some of them. Our own Chuck Littlewood, K4HF is an Assistant Director, and so is Bill Edwards, K4BWC, owner of Omega Electronics in Knightdale.

The only other position I'll mention is the Section Traffic Manager. That's the person that keeps the radiograms moving through the Section. The position has been filled for the last 8 years by Will Harper, K4IWW of Cary. Will has stepped down, and is being succeeded by Don Negus, NØSU, of Bryson City. Will continues to serve as Net

# May Meeting Program: History of the Telegraph

Jeff Wittich AC4ZO

Greetings members. I pleased to announce that it's once again my turn to be the Speaker at RARS. I have selected a favorite topic: **The Invention of the Telegraph**. This is a program that some of you may remember from October 1996, and it provides a unique opportunity for members. We are asking you to bring out your cherished telegraph keys and apparatus. Many of us have a few that we're proud of, but never get a chance to show them off. Now's that chance. It was popular before, and we hope will be popular this time as well. So get them out, dust them off, and set them proudly on the display tables.

The meeting will be May 2, but we'll be meeting in the upstairs room where we met last October and November. See you there, and don't forget you keys! ■

## FCC FCC Questions NC Ham

ARRL Letter

The FCC has zeroed in on a Newton, North Carolina, Extra class licensee as a prime suspect in its "Captain Truth" investigation into unidentified Amateur Radio transmissions and malicious interference.

FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth wrote John M. Yount, K4QIJ, on March 29, citing FCC and other close-in monitoring evidence to indicate that Yount's station was the source of "malicious interference and jamming" on 20 and 75 meters. "Radio direction finding bearings have led to your residence and antenna at 225 N Gate Road in Newton," Hollingsworth told Yount. The FCC said part of its monitoring evidence resulted from work done by the FCC's High-Frequency Direction Finding facility in Columbia, Maryland.

"Our evidence indicates that you have made unidentified transmissions, transmissions identified by the call sign 'K4OKA' as well as 'Captain Truth,' 'Sodomizer,' 'Captain Sod' and numerous derivatives thereof," Hollingsworth wrote. The call sign K4OKA is assigned to John A. "Al" Abernethy of Hickory, North Carolina. Abernethy last year lost his HF privileges for six months following an FCC inspection visit to his station in early 1999 and complaints of deliberate interference.

The FCC said its evidence in the "Captain Truth" case indicated that the malicious interference and jamming occurred at various times since March 1999--up to as recently as March 24 of this year.

Hollingsworth gave Yount 30 days to respond to the allegations in detail. Failure to respond, he told Yount, could result revocation and suspension proceedings. Hollingsworth also invited Yount to contact him to discuss the matter further. ■

Manager for the Carolinas Net.

I don't know if this much movement is normal in the League or not. I've not seen this much at one time since I've been a ham, but that's not been very long. In any case, these are the names you will be hearing from time to time when official matters are discussed. I know for most of us that's not very often, but, well... that's who they are. ■

# Batteries In The Hamshack – Part 2

Jeff Wittich AC4ZO

## Failure Modes and Measurements

Last month, we looked inside a lead acid battery to see how they are made, and what some of the differences are between the various types. Now, let's look at some of the not so good things that go on inside them that shortens their life to that of, say, a pint of ice cream in AC4ZO's freezer.

**First and foremost, is the problem of sulfation of the plates.** When the battery is discharged, one of the side effects of the chemical reaction that takes place, is the formation of lead sulfate crystals on the plates. They can easily be seen with a flashlight, and appear all sparkly. They are often easier to see on the gray colored negative plates than on the black positive plates.

A fully charged battery will not have them. The problem with them is, the longer they are left, the harder they get. After a few weeks they will be so hard that they will not dissolve when the battery is finally charged. The coating of crystals has a high resistance, and increases the internal resistance of the battery. Internal resistance is what makes the voltage drop as the current demand increases.

A 12 volt battery with a low internal resistance can supply more current without much voltage drop than a similarly sized battery with a higher internal resistance. What this means to the ham is that a fully charged 24 amp hour battery in good shape will supply about 11.9 volts to a typical mobile radio while transmitting on high power. The same battery which has routinely been left in a partially charged state for a few weeks can only supply maybe 10 volts, even after a hefty charge. Sulfation is the most common cause of performance degradation in traction batteries. To prevent sulfation problems, don't leave a battery discharged for long.

**Another common cause of failure is deterioration of the positive plates.** This is why most car batteries fail. As the battery is used, even in its intended purpose, the positive plate begins a slow process of falling apart. It's most astonishing, but they also grow as they deteriorate.

When the plates deteriorate to the point they can no longer hold the paste, the battery fails. That's when you go outside and your car won't start, even though it seemed fine the day before. Temperature changes tend to cause the paste to separate from the grid too. So very hot and very cold days are when we see these failures.

Plate deterioration rate is a function of the thickness of the grid. Car batteries have grids in the range of .04 to .10 inches thick. They last from 3 to 5 years normally. A good stationary cell has plate grids up to .3 inches, and typically about .25 inches thick. These plates last 15 to 20 years. A car battery with a typical reserve capacity of 96 amp hours and 600 cold cranking amps using storage plates would be about 10 inches high, 8 inches wide, and 4 feet long. It would weigh 300 pounds, and cost about \$1000 if mass produced. But it still wouldn't be rugged enough for mobile use, and would only last a few years.

The positive plate growth is not usually a problem in flooded cells. That's because the jar is usually much larger than the plates so that the acid can completely cover the plates, and then some. The loss of water through normal use then is not a

problem as long as the level doesn't get too low. In the case of the VRLA battery, the jar is just barely big enough to accommodate the plates. No extra space is needed since the acid is immobile. In this case, it doesn't take much plate

growth before you can see the jar bulging and eventually crack. This is a problem with the batteries we use so often in ham radio. If you have one or more of these "sealed" batteries behind your console, or next to your couch, be sure to put some plastic under them and check them for cracks once a year or so. They bulge quite a bit before cracking, but even when they do, they are slow to make a mess. No juice comes out, but soon a toxic white corrosion looking deposit will start forming around the crack. It's very corrosive, so handle with care at this point.

**Electrolyte loss can be a problem.** We'll get deeper into this in the article on chemistry, but basically, when a battery is charged, as it approaches full charge, excess energy is forced through the cell and as a result some of the water is electrolyzed generating both hydrogen and oxygen gasses which escape through the vent (or valve). To quantify things, a 12 volt battery with flooded cells loses about .2 ounces of water for each amp hour of over charge. A typical automotive type battery charger will "boil away" about a cup of water every 3 hours if left on a fully charged battery. Since the VRLA batteries that most of us use for ham radio purposes do not have a means of replenishing the water, overcharging means the death of the battery.

**Electrolyte stratification is another anomaly which tends to shorten the life of a cell.** Battery acid weighs more than water. A lot more. A gallon of water weighs about 8 pounds. A gallon of battery acid weighs about 9 pounds 13 ounces. When a battery is discharged, the juice inside is converted from acid to water. The plates pick up the lost weight in the form of lead sulfate crystals.

When the battery is charged, the water is converted back to acid, but as the heavier acid is formed, it falls to the bottom of the jar. If left alone, the heavy acid at the bottom never will mix with the weaker, lighter acid at the top. When the battery is subsequently used, most of the current flows through the lower part of the plate, accelerating the plate deterioration in that area. Often the bottom of the plates in a flooded cell are in much worse condition than the top of the plates. The older the battery, the worse the problem. If you are using a flooded deep cell marine battery in the shack, just jostle it about a few times a year to alleviate the problem. If it's in a boat, the normal motion of the boat will do the job. Stratification is not a problem in gel-cells, or absorbed glass mat (VRLA) batteries because the electrolyte is immobilized.

So, we know that maintenance (or lack of) plays a big part in the life of the battery. And maintenance comes in the form of charging, and parameter monitoring. Since charging will be covered next month, I'll concentrate on measurements for now.

**Measurements** in flooded cells point us to maintenance actions that can be performed to prolong the life of the cell. In the case of VRLA batteries, we take the measurements and can tell if something is going wrong, but there's not much we can do about it, since the cells are "maintenance free."

What exactly are these parameters to be measured? Well, the question is not easily answered. Indeed, power maintenance companies can't even agree on what measurements are useful and what are not. And they use the misunderstood importance of some of the measurements to one-up their competition. *Here's what I think is important:* For flooded cells, voltage, specific gravity, and connection resistance. For VRLA batteries,

## BATTERIES *continued from previous page*

cell voltage, internal resistance, and connection resistance.

Let's look at the flooded cells first. Cell voltage is the quickest way to determine if something is going wrong with the battery. If you have individual 2 volt cells, each cell has posts at which the voltage can be measured. If it's a multicell battery like a car battery, it's a little harder, but can be done while the battery is sitting on a power supply set to about 13.2 volts. For the obvious legal reasons, I don't recommend that you do this. This is provided for information only. If you remove the cell caps, you can stick the voltmeter probes right down in the acid. They don't need to go deep, just touch the surface. You should read about 2.2 volts or so. If you read less than this, one of the two cells that the probes are in is bad. It doesn't really matter which one, since it can't easily be repaired anyway. Notice that the end cells can't be measured this way, because there is no "next" cell to stick the probe in. In the case of end cells, look for about 1.9 volts from the positive post to that cells acid, and there should be about .3 volts from the negative post to that cells acid. Actually, this is a bit of overkill, but it's here because it's sort of interesting.

Specific gravity is measured with a hydrometer available from an auto parts store. Some of the acid is sucked up into the hydrometer, and a floating device inside reads out the specific gravity. Expect to see figures around 1.225 for a fully charged battery, but the actual figure is not as important as any variance between cells. As a battery is discharged, the specific gravity will drop. It will restore to normal when the battery is recharged.

Connection resistance is very important with individual cells, but for a multicell battery, the only connection that can be tested is the post-to-clamp connection. It's not as important then. An expensive micro-ohm meter is required to properly do this test, so just tug on the wire, and clean the post periodically, and it should be fine.

There is no substitution for a load test. This is the definitive test of any battery. It's a matter of discharging the battery and actually measuring how much charge it holds. Details on this next month when the discussion will be *charging*.

There are many other tests that can be performed, but they are of little use. A plate polarity test is the only other test worth mentioning. I've seen this touted by maintenance companies only in recent years. It's a measurement of how much of the "charge" is stored on the positive plates with respect to the negative plates. It's measured by placing an electrode containing some active element into the acid, and connecting it to a millivolt meter. Readings above a certain range indicate too much of the charge residing on the positive plate, and readings below a certain range means the negative plates are too "hot." There is nothing that can be done about an imbalance anyway, so lets not worry about it.

Now, for the VRLA battery. If it's in the form of individual cells, the cell voltages are important. One cell lower than the rest means it's going bad, and the rest will likely soon follow. If it's a multicell battery, there is no easy way of measuring cell voltages. Connection resistance is the same as for flooded cells.

A more important measurement for VRLA batteries is the internal resistance, also called internal impedance. Fancy test equipment can be used that applies a load to the battery, and calculates the resistance from the voltage drop. For a go/no-go test, you can do a similar thing with two number 1157 automobile lamps wired in parallel. At 12 volts, this arrangement will draw about 4 amps. When connected to a 7 amp hour battery, the voltage will naturally drop. It should drop to no less than about 2.15 volts per cell in the first 2 or 3 minutes. For a larger

battery, use more lamps so that the battery would discharge in about an hour if left on. Voltages that drop to below this level indicate high internal resistances, and a less than optimal battery.

Well, this is not all of the things that can go wrong in your battery, but I think it covers most of the common failures we encounter frequently, and how to see them coming.

**Next month: *Charging and chemistry.***

## DFMA Hosts Spring Spotter Training



*George Lemmons at the DFMA's Spotter Training*



*photos courtesy of KG4AWG*



The Durham FM Assn. hosted a large crowd for Skywarn Spotter Training in late March. The NWS's George Lemmons lead the session, as usual. There will be no spotter training in Raleigh this year, but there will be a session in Wilson on May 15.

## SWL/Scanner Report

**Kelly Mills AE4FG**

The April meeting of the Scanner/SWL SIG was held on the 17th at the El Rodeo restaurant on Pleasant Valley Road in Raleigh.

Several topics were discussed concerning radio monitoring and radio resources on the web. Two new frequency lists for the Raleigh and Triangle area were also distributed.

Darrell Gammon, KF4URC, brought in and discussed a Hallicrafters SX-62A shortwave. Kelly Mills, AE4FG, demonstrated the Sony ICF-SC1PC computer controlled scanner. The meeting adjourned at 9:00.

The May meeting will be held on the 15th (third Monday). Bill Cole, KG4CXY, will be giving a presentation on utility HF monitoring in preparation for our May 20th SWL listening event at Jordan Lake. Join us at 6:30 for a meal at El Rodeo. The meeting will begin at 7:30.

The Scanner/SWL net is now being held each Monday night at 9:00 on the 146.64 repeater.

For more information, e-mail Bob Zeher (ke4jvy@juno.com) or Kelly Mills (ae4fg@hotmail.com), or call Bob at 844-9757. ■



## Snapshots from the RARSfest



**Roller Derby:** RARSfest Chair **Cyndi KD4ACW** has inspired a copycat. **Fred N4IXL** also skated across the vast building on Saturday. But Fred - where are the pink laces? Above, Greg W4IK spent the winter handling pre-registration tickets and table sales. Cyndi checks his results.



On Saturday, **Mike KU4RM** (above) and **Bernard W4BRB** chose bicycles to cover the distance. What's next? Skateboards? Perhaps golf carts?



Classmates **Ron KG4FJA** and **Bob KG4FIO** pledged to return effort to the club after earning their tickets in last fall's Novice/Tech class. Ron took on the Security Chair job, and Bob helped out all day.



**PUT YOUR TICKET STUB IN THE BARREL** - you just might win a prize. Below, **Ginger KD4OKP** looks happy to hand over one of four Icom 207H Dual Bander to Elliot Layden KF4ROS. The Icom 706 Grand Prize went to Johnny Harkey WD4SDF of Concord, NC.



**The SOCIAL** was popular as usual, thanks to **Mary Jo Littlewood**, the RARS Crystals and members who brought covered dishes to feed the crowd Saturday night. Left: **Larry Carrington** entertained the crowd at the Social, then worked Security on Sunday. Right: **Riley K4ZDH** dines with the Wittich brothers - AC4ZO and N3VEJ.





## THANKS TO EVERYONE WHO HELPED!



The FCC's **Riley Hollingsworth K4ZDH** spoke to a packed house for about an hour. Before that, he wandered the flea market, but failed to pick up an FT-101 he had his eye on. Riley told Cyndi that next year he just might show up with rollerblades.



**VE TESTING** was mobbed with well over 100 hams taking tests at one of the last test sessions before the April 15 Restructuring deadline.



Ticket Sales Chairman **Bill KG4CXY** "supervises" **Rick N4VQT** and **Barbie N4YRO**, as they check folks in at the west door.



**Flea Market** table sales were down. Perhaps it was the price increase, or gas prices, or the weather? But business was good for those who did set up. Better news was that ticket sales stopped their downward slide, and were almost even with last year. Now, how about sending those numbers back up? Everybody says the RARSfest is a great hamfest. Spread the word!



**CONTESTS** were popular again. Above, the QLF "Left Foot" sending key looms large. And contest judge **Rick KA3PSK** demonstrates the QBH machine. It's harder than it looks! Especially the periods!



It only lasts 8 hours, and then it's time to go. The RARS Dumpster Diver SIG takes over. Their reward for stacking up the tables and chairs is they get to haul away all the "left-overs." And sell them at the next hamfest.



**Civil Air Patrol Cadets** earn money for their squadron by helping vendors move their stuff, and by bringing lunch to vendors and staff.

## PRODUCT REVIEW

# Psssst!...PSK31... pass it on...

*Fred Decker N4IXL*

**Pass the word!** No, it's really no big secret and it isn't a top-secret test facility near Roswell New Mexico, but it is one of the latest and most popular new radio-teletype (RTTY) type communications protocols. Developed by Peter Martinez G3PLX, PSK31 is fun, easy to get started with, and is available for free with anyone with a computer and a sound card.

**What is PSK31?** It is a digital mode, that allows for "live QSO's" rather than transferring packets of digital data. That means it operates much like any Internet chat program, such as ICQ, only over the HAM bands. The format is not error free, though surprisingly reliable for a non error-checking protocol. Its extremely low bandwidth requirements, resistance to noise, readability with the lowest of signals, and low power/antenna requirements, make it one of the hottest topics in HAM radio.

What's interesting about PSK31? Well, for one it is an "advancement of the radio art" as prescribed by our mission. PSK31 would not be possible without creative Hams like Peter, today's dead-on frequency stable rigs, and filters to tune out adjacent signals and tune in the ones we want. Additionally, today's computers and sound cards, and software programmed DSP (digital signal processing) capabilities allow us to further home in on the signal we want. Morse code aficionados will love the fact that the creator of this mode based it on the simplicity and efficiency of CW.

Like Morse code, PSK31 is just an on-off sequence, or a digital transmission. Instead of turning the carrier on and off however, we vary the tone of an audio carrier that is sent over the air to effectively reverse the polarity of the carrier. We create 2 sidebands on a suppressed carrier or two tones on either side of our SSB frequency. The shortest code can just be a 1, then 11, then 101. Since a zero only carries data when it is between two ones (you can't hear silence), more than one zero in a row is not allowed. We can represent the entire ASCII 128 character set in only 10 bits! To make things even more efficient, the inventor used a clever scheme of determining the most used characters in our alphabet and making them the shortest characters. Using this method, PSK31 is even more efficient than CW. On the same time scale, at the same speed, PSK31 can transfer more information.

This brings us to how PSK31 got its name. First, from using a shifting tone to represent a zero or a one, we have the modulation method which is *Phase Shift Keying* or PSK. Then, to allow for a reasonable character speed of 50 wpm (not too fast, not too slow), the math works out to a bit rate of about 32 bits per second. The way sound cards and DSP's work with a minimal 8kHz sample rate led to the choice of 31.25 bits per second, or just a 31-80 Hz bandwidth! Put it all together and you have PSK31! It turns out there are two formats for this, Binary Phase Shift Keying (BPSK) and a less used, error-correcting version called Quaternary Phase Shift Keying (QPSK)

### What do you need to get started?

All you need is a computer, some free software, a soundcard, and a microphone. In it's simplest form (and very reliable I might add), you just put the microphone anywhere near the speaker, tune into an SSB frequency that is band planned for

PSK31, load the software, and adjust your rig filter and frequency to tune a visual indicator on the software program. That's it! In no time, you are copying often perfect, typed QSO's, often without even being able to hear a signal. The other night, in the middle of the early morning on 20 meters, I was talking in a roundtable with Colorado, New York and several stations in Japan. The Japan stations were not making a measurable swing on my s-meter.

The *PSK31 Freqs* box lists the normal bands to tune in to listen.

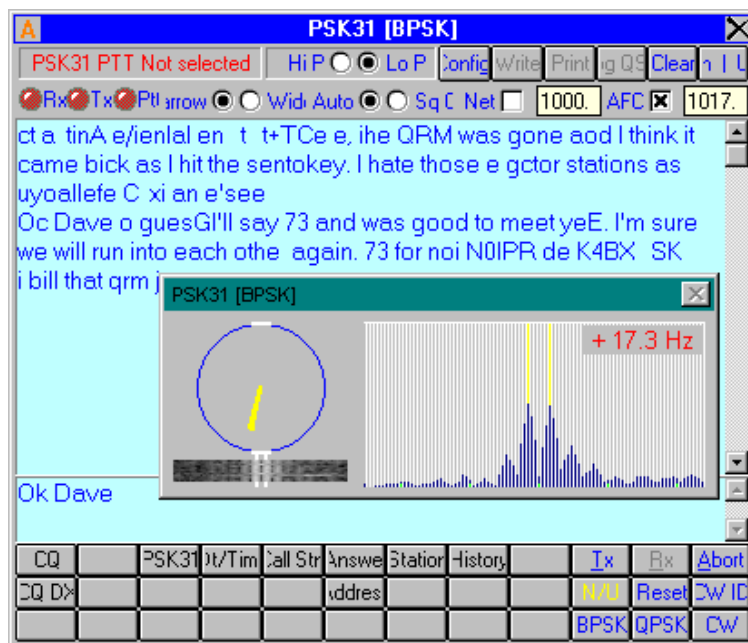
What you want to hear on strong signals is a high pitched (around 800-1000Hz) tone, with a distortion or warbling on it. A few of the links at the bottom of this article have sound files for you to hear examples.

When you are ready to transmit, you can use the "poor man's" choice of putting the microphone of your radio near the computers speakers, locking it into transmit, and then starting the transmit tone on your computer program and beginning to type. When you get tired of the cumbersome nature of this method, you can wire a very simple cable connection between the rig and the sound card. Again, plans for these are on the provided WEB links.

Here is an example screen of a QSO from my free "Logger" software.

### PSK31 Freqs

1838.150  
3580.150  
7035.150 Region 1, 3  
7080.150 Region 2  
10140.150  
14070.150  
18100.150  
21080.150  
24920.150  
28120.150



What you see, in order to get it to fit into a small picture, is my QSO window, with my tuning tool window on top. In the light blue text window, you can see the sending station at the top, and my not yet sent text in the lower portion of the window. Any garbled text is while I was tuning the radio.

The tuning window shows a circle, with a yellow line that jumps around to show you noise and tuning. The closer to straight up and down it is, signifying the perfect phase reversal, the better. The grayscale display below the circle is a "waterfall display". It is a continually updated audio spectral analysis that "flows" or

*CONTINUED..... next page*



## Field Day Tips: CHECKLIST

### FOR THE STATION:

- Rig(s)
- Keyer, bug, straight key, mic, headphones
- Antenna(s)
- Tuner(s), antenna switch and extra cables
- 100' coax or open wire line per antenna
- Coax patch cable for rig to filter. RARS will supply bandpass filters for 80, 40 and 20. These filters have standard SO-239 connectors. A second coax patch cable for filter to tuner.
- Slingshot (wrist rocket type) with 5 or 6 2 oz lead egg or tear drop style weights. New 1000' (minimum) spool of 8 lb test monofilament line. It's a good idea to spray paint the weights with a bright fluorescent color to make them easy to spot in the trees. Some people prefer a bow and arrow rig for getting line over a limb. Please keep safety first
- Mason line or light rope for wire antenna support
- Roll of bright plastic streamer tape for marking ropes, strings, feedline and other hazards
- Logging computer(s)
- 2 pads of paper, plenty of pencils/pens
- Clock set to UTC
- Table, chairs
- At least 2 100' outdoor extension cords unless you are bringing a generator
- Multi outlet strip(s)
- Ground rod
- Lights
- Basic hand tools including pocket knife, electrical tape, soldering equipment, VOM, general purpose hookup wire
- Optional shelter (screen room is probably best if not operating in a cabin) and optional tarps



Jeff Wittich AC4ZO  
Field Day Chairman

### BAND CAPTAINS:

10 and 15 meter K4HF,  
CW and Phone W4IK  
20 CW AC4ZO  
20 Phone N4IXL  
40 CW N4HAF  
40 Phone WA4BPJ  
80 CW (OPEN)  
80 Phone KN4AQ  
Digital (OPEN)  
Novice/Tech W2BYV  
VHF N1GMV

### BONUS POINTS:

Emergency Power ALL  
Natural Power (OPEN)  
Satellite (OPEN)  
Publicity (OPEN)  
Message Relay KG4CXY  
Message to Section Manager KG4CXY  
W1AW Message (OPEN)  
APRS Demo W2BYV

### OTHER IMPORTANT STUFF:

Chef (OPEN)

KG4FIO can provide a 10KVA generator for anyone that needs it. W4KGL will be available to help with setup for anyone who needs it. He also has a large quantity of military antenna wire.

### SUSTENANCE:

Food, drinks (no alcohol), snacks, plates, cups, napkins, ice chest and ice. Several large trash bags.

### SAFETY/COMFORT:

Electric fan, flashlights, hat, sunscreen, bug repellent, basic first aid kit, fire extinguisher, umbrella (hope it's not needed!)

### HYGIENE:

toilet paper, paper towels, hand soap, wash cloth, towel, tooth-paste, toothbrush, hair brush, Fuller brush (and all the things your mommy made you take to a sleepover). ■

## FOR SALE:

3 Radio Shack HTX-200 mini-HT's.  
\$150 ea. or best offer. Never used.

Contact Jim Hart (in Raleigh) at 787-9705



## PSK31 continued from previous page

falls downward. You can see that I am tuned in to the two sidebands and they are distinct from the noise.

In the last part of the tuning window, the one that looks like the twin Empire State buildings with yellow light beams shooting out their tops, you can see me tuned dead on to the sidebands. Normally, these peaks would jump right out of an almost invisible noise floor, but here you can see other strong signals right next to our peaks, and other garbage at lower levels across the page. You can also read the partial QSO and see the other station refer to GTOR stations. Somebody was clobbering him and I could still read him almost perfectly once I got him tuned in.

A final note, is that this mode is perfect for QRP. You can try to use the lowest possible power and see what contacts you can log. Since you are modulating the carrier with a steady tone, the

duty cycle of the transmission is high as compared to normal voice transmissions. You might want to use this as a warning to be careful not to carry on long transmissions without a break. Most people hardly use any more than 50 watts on a 100 watt rig, if that.

If you choose to tune the bands, I think you will be surprised to see how much has been hiding there between stations that you never new existed. I hope I can enroll a few others in the area to get on here locally. I wouldn't want to have all this fun all by myself! For more information, visit these WEB links:

<http://bipt106.bi.ehu.es/psk31.html>

<http://www.alltel.net/~rixner/psk31.htm>

<http://www.w5bbr.com/psk31.html> ■

## RADIO REVIEW

# The Yaesu FT-100 and ATAS-100

## Is it fit to be called a Field Commander?

John Aceti N1GMV

Back in the early 70's I noticed a Full size station wagon pull into a gas station with a gigantic antenna. Since I was interested in communications equipment I just had to take a sneak peak at what was set in this thing. To my amazement I noticed a *full sized Yaesu 101* mounted under the dash. Wow!

Years have gone by since that day and I have installed quite a few mobile radios in different vehicles. They were all the same in one aspect. They would all require me to stop, open the trunk, find the right coil and replace the existing one on my antenna mast when changing bands. It didn't matter what band I was set for, seemed I always wanted to go to another!

Now, thanks to the wonderful invention of the "Screwdriver" antenna, coil changes are becoming a thing of the past. Unfortunately, these antennas are quite large and raise an eyebrow or two when pulling up to your local supermarket. Basically these are way too big! Lets face it, today we don't have the room under our dashboards to mount a FT101 nor do we want to have a street trolley sized pole trolling the skyline!

The 2 main options if we want one small radio for HF/VHF/UHF:

- ICOM 706
- YAESU FT-100

### Our Options if we want an HF antenna:



- **LARGE** - Screwdriver type, Bug Catcher etc.
- **Medium** - Hustler, Hamstick, Outbacker
- **Dummy load** - Anything smaller is too inefficient

I chose the FT-100 primarily because of its integration with the **YAESU ATAS-100** (Active Tuned Antenna System) providing HF through 440 coverage with nothing more than a push of a button! The ATAS-100, a 5 foot antenna, works from 40 Meters to 6 Meters and when fully retracted works (somewhat) on 2 and 440.

Here is an analysis of my FT-100/ATAS-100 installation:

**Power:** The rig is supposed to be 100 watts. When operating, the internal meter peaks at 100 watts on HF however, I only read an average of 50 watts on my peak reading MFJ meter. This same meter shows 80 watts with my IC-735. Has anyone seen my other 50 watts anywhere?

**Hot!** The unit gets unusually hot when running full output on 2 meter FM. All other bands and modes seem fine. I suppose the mounting bracket will help sink some of this heat from the unit.



**Operation:** Menus Menus and more Menus! Can I get *HBO* here? 9 main menu's, 66 sub menu's and function keys which have dual functions! Don't let this scare you though, I found that after a contest weekend I was able to be quite proficient with the menus, only referring to the book once or twice. Maybe I will offer Yaesu FT100 Certification Classes!

**Cool Functions:** Such as Talk out Timer (Repeater pre-timeout warning), Auto Power Off (No need to call AAA for a jumpstart) and Digital Signal Processing - way KEWL! I might add that this radio comes with a DTMF microphone unlike the ICOM in the event you wish to use an autopatch!

### Boo for Blue:



Yes, the radio is **on** in both these pictures. The only thing changed is the position of my vehicle! Keep this in mind before mounting the head. Do NOT mount it high on the dash!

### The ATAS-100: Up 'n Down!

Tune to the frequency, press TUNE momentarily, the radio and antenna will do the rest!

The radio transmits a low output carrier while it sends dc pulses to the ATAS-100. Once the SWR falls into spec, the



Tuned to 7 MHz



Tuned to 50 MHz

radio switches back to receive mode. I have had no problems with SWR on any band including the WARC bands with this antenna. I give this antenna a 9! The antenna requires an SO-239 mount. Get a heavy duty one! I used the one from Comet, which came complete with its instructions that I cannot read. Anyone here speak Japanese? If you use a diplexer you may use the ATAS-100 for HF/6 and VHF/UHF. I tested this antenna on VHF and UHF, the SWR was great but the signals were very low (2-3 S-units lower) in comparison to my Diamond 7200 NMO as shown. So, I decided to use it for only 40-6 meters and keep the Diamond for use on the high bands.

**Mounting the Radio:** This radio is so small you can mount it almost anywhere. I chose to mount mine in the trunk so had to order the separation kit to extend the speaker, microphone and front display. This kit also included the mounting bracket for the head. When mounting the unit in the trunk be sure to mount the front facing the opening. This will allow you to mount the faceplate on the rig for troubleshooting or remote operation. Be sure to fuse both

ends of the power lead and install a 35 Volt MOV across the positive and ground just before the radio. Spikes from starting the vehicle will cause this unit to change frequencies!

In final, I would say that this radio setup performs quite well. Is it worthy of being called a *Field Commander*? **NO WAY**, not with only 100 watts! Then again, I am driving a Monte Carlo, not a Hummer! Just like anything else there are always a few pitfalls. Overall, I would buy another one over the ICOM 706. And in the event I ever work someone running a 706? It's okay, I will wait for them while they change bands! ■



# Club Meeting Minutes

## April, 2000

The regular meeting of the Raleigh Amateur Radio Society was held on April 4, 2000 at the Forest Hills Baptist Church on Clark Avenue. The meeting was called to order at 7:36p by Vice President Tim Nicholson, KF4RTX, who welcomed 58 members and 4 guests.

Tim immediately announced the exam session which had just gotten underway, and that tickets for the Durham hamfest scheduled for May 27 were on sale in the back of the room.

Jeff AC4ZO announced that the program topic for the May meeting would be "The Invention Of The Telegraph," and invited members to bring their telegraph apparatus to display before the meeting.

With that completing the announcements, KF4RTX took the podium once again for the annual awards presentation. The following certificates were awarded: KF4JKQ, 1999 Skywarn EC and EOC coordinator; N4IXL, Repeater Technician and 501(c)(3) champion; AB4W, NC ARRL Section Manager; N0WP, 1999 Field Day Chairman; KD4ACW, 1999 Rarsfest Chairperson; W4BRB, FM Committee Chairman; N4CAR, Repeater Technician and programmer; KF4RDP, 1999 Webmaster; W2BYV, Wake County EC and RARS Public Service Director; Dolly Sickles, Interim Exciter Editor; KF4RTX, Webmaster. Verbal recognition went to the following: RARS Class instructors; Volunteer Examiners; net control operators; Hamfest Volunteers.

Tim introduced Cyndi, KD4ACW at 7:50p who presented information on the impending hamfest.

At 8:30, Tim presented a plaque to outgoing President Gary Pearce, KN4AQ, who by this time had arrived.

Door prizes went to W4IK, W4KGL, KO4TV, KA2FWC, and KB4RZ.

The meeting adjourned at 8:41p.

Jeff Wittich AC4ZO, Secretary

# Board Meeting Minutes

## March, 2000

Minutes of the RARS March Board Meeting - March 21, 2000

The monthly Board meeting of the Raleigh Amateur Radio Society was held at the Forest Hills Baptist Church on March 21. The meeting was called to order by Vice President Tim Nicholson KF4RTX at 7:30p. Members present at that time were: KD4ACW, KN4AQ, KG4CXY, N4IXL, AB4OZ, KO4QH, KF4RDP, KF4RTX, N4YRD, and AC4ZO. The total attendance was 13.

On motion by KF4RTX, seconded by KN4AQ, the minutes of the February meeting were approved.

KF4RTX gave the VP report. The April meeting will feature the annual awards presentation, and a program about the hamfest, and May will feature a presentation on telegraphy. Contesting is the topic for June, and Emergency Preparedness in July.

### Committee Reports:

In the FM Committee report, N4IXL said that all outstanding bills from the repeater move have been paid. Also, we have received final approval to install a 2 meter repeater on a water tower in RTP. Fred's plan is to provide linked access to 146.64 from RTP.

KO4QH reported on the Education Department. She said that the code class is well under way, with two weeks to go. There have been a few dropouts.

KN4AQ reported on the Exciter. He said the April edition is ready to go to print, and that all is running smoothly, with no outstanding issues.

It was brought to the attention of the Board that we have been asked for communication assistance by the National MS Society for two events. The first is on April 1 in Cary, and the second is in Raleigh on April 9. No action was taken by the Board, but it was noted that there is an item under New Business to address the recent resignation of the RARS Public Service Director.

In the Webmaster report, KF4RDP said that page usage is increasing, and we are now getting about 300 hits per week. Cliff provided data on specific file usage.

KD4ACW gave the Hamfest report. She said that the committee chair positions are all staffed, and recruiting is under way. An issue regarding the examination room was brought up, but deferred since it was already on the agenda under New Business.

### Unfinished Business:

An item concerning the policy for the acquisition of

assets was discussed. It was an item carried over from the February meeting, and resulted in an action item which could not yet be resolved. The Secretary was directed to carry the item to the April agenda. Then, there was a discussion about how we would operate the RARS table at the hamfest. A motion was made by AB4OZ, seconded by KF4RDP that we under the same policy as last year. After still more discussion, the motion passed.

The issue of Club Bylaws was heard. The item came about as a result of our new Corporation. A motion was made by N4IXL and seconded by KG4CXY that we recommend to the membership that we adopt the proposed bylaws dated January 25 to be our operating rules. The motion was carried. Another motion was made to amend the bylaws, should they be adopted by the Club, to change the Quorum to Conduct Business from 51 percent to 7 Board members. A roll call vote was called. Voting for was AC4ZO, KN4AQ, KG4CXY, AB4OZ, and KO4QH. Voting against was KF4RDP, KD4ACW, N4IXL, and N4YRD. The motion was carried.

### New Business:

Charles Scharlau, N20I brought a request to the Board. He has scheduled two fox hunts in the coming weeks. One is scheduled for April 1 in Carrboro, and the second will be April 16 in Umstead Park. Proof of Liability insurance coverage is required for the Umstead Park event, and Charles asked the Club to sponsor the event. A motion was made by KF4RDP, seconded by KO4QH that we approve the operation as a RARS event. The motion passed, and KD4ACW accepted the action to coordinate the paperwork.

KN4AQ addressed the Spring Class planning. He said that due to the licensing restructuring, there will not be a class this Spring, but that a Summer class may be conducted.

The annual awards presentation was not done in the March meeting this year which is our custom. KF4RTX will coordinate the effort, and we will present the awards at the April meeting.

The issue of the resignation of the RARS Public Service Director was heard. After a short discussion, the Secretary accepted the action of coordinating the appointment of a Nominating Committee to fill the position.

KD4ACW made a request to the Board concerning a room for VE testing at the hamfest. It had been agreed that we would not rent the Holshouser Building this year because of the steady drop-off in the number of exams conducted at hamfests. However, with the impending restructuring, testing at surrounding sessions has been at a level not seen in recent years. A motion was made by AC4ZO, seconded by N4IXL that we approve the expenditure to rent the Holshouser Building for VE testing. The motion passed.

At this point, the Action Register was reviewed. Several items were closed, and 3 items were added. The current register is always on File in the Secretary's office.

### Announcements and Board Member Comments:

KG4CXY distributed statistical data on activity of the RARS 2 Meter Net.

KO4QH announced that NA4G and W4TIM have recently done a presentation on ham radio at Wiley Elementary School.

With the business complete, on motion by AC4ZO, seconded by KD4ACW, the meeting adjourned at 9:33p.

Respectfully submitted,

Jeff Wittich AC4ZO, Secretary

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## Fox Hunts



Can you find the "fox" in this picture? Can you find the Hunter? Chris Petrich, NCSU student from Germany, is closing in on the first of 6 hidden transmitters in Umstead Park on April 16. Chris is waiting for his US ham license to arrive. When he returns to DL, he'll have to take another test.

## Hamfest Calendar

**May 13:** Greenville (Antique RC Meet)  
**May 27:** DurHAMfest - Durham  
**June 4:** Manassas, VA  
**June 10:** Winston-Salem

courtesy of the **SERA Repeater Journal**



*Jim Heinis WA4RCU and John Swartz KB1DLB take their first bearing.*

Triangle Fox Hunting is off to a great start again with these unique European style hunts, thanks to Charles Scharlau NZØI.

Hunters searched on foot for a total of six transmitters, some hidden among several decoys. Look for more info in the June Exciter. More hunts are planned. Check Charles' web site for details: [www.qsl.net/nz0i](http://www.qsl.net/nz0i)